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Deplores Japan for Lack of "Gratitude"

Q&A With James Watson, Genome Project Chief

In title, influence, and force of personality, James D. Watson is the world-recognized leader of the biggest enterprise ever undertaken in the life sciences—the mapping and sequencing of the human genome, a 15-year, $2-billion project now gathering speed at the National Institutes of Health, where Watson is Director of the National Center for Human Genome Research. A Nobel laureate and author of The Double Helix, *Watson also is Director of the Cold Spring Harbor (NY) Laboratory. He spoke March 12 with Editor Greenberg at the SGR office in Washington. Following is the text, transcribed and edited by SGR.*

SGR. *You agitated some Japanese with your letter last summer to [Kenichi] Matsubara [of Osaka University, head of the Human Genome Program in the Japanese Ministry of Education] about Japan's role in the project.*

Watson. I really said two things. He wanted me to go over [to Japan] and talk to government bureaucrats. I had done that ten years ago when they wanted to start an Asia molecular biology organization. I discovered after I'd been there that there was no unity in Japan, and what I said [to them] was that it was just a total waste of time for myself and my host. There's no unity in Japan now, and everything I know about Japan is that Americans have little influence on the system. So, my letter to him said I'd be glad to come when they had some unity. It turns out that Matsubara is not leading the Japanese effort. He's one of several quite competent people, but there's no leadership and he has very little money. He gets his money from the Ministry of Education and then there's MITI [Ministry of International Trade and Industry], and there's a few others which are supporting some things.

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The other thing I said was that I hoped, because they had been wishy-washy about whether they support HUGO [Human Genome Research Organization, a private, international association of genome-research institutions], is that I thought HUGO was the natural way. They had said there was going to be the Human Frontier [a Japanese-financed international research program, never clearly defined], and that seemed to be a dead end. Then they said the law was that they couldn't support anything like this. At which point—I had just been to the Wellcome Trust [a British biomedical philanthropy], and they indicated they were going to put substantial support in. And I wrote this letter [to Matsubara] after I visited Wellcome. Wellcome didn't definitely [make a commitment], but [its interest] indicated [to me] that the Japanese component of support should be bigger than the English, just on the basis of population. I didn't intend to release the letter, but—I don't know how it got released.

SGR. *It has been interpreted by the Japanese as extremely hostile. It's been called "blackmail."*

Watson. I think you're going to have a problem that will refer not only to the Japanese but to anyone else. When we get all this sequence data, when will it be released? Now, no one has up till now released any sequence data until they've spent time interpreting it, and if they see something that might be patentable, patenting it. That's what's happened up till now for everyone. No one has released data until they've had a good chance to look at it. There have been some conceivably idealistic schemes by which the data would be released into the genome bank immediately, that

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In Brief

The effect of European economic integration on trans-Atlantic scientific relations is a popular subject on the Washington policy-studies circuit. The National Science Board, policy maker for NSF, has its own Euro '92 task force, chaired by James Holderman, President of the University of South Carolina. The National Academy of Sciences took up the subject at a packed meeting March 5-6 (see Page 5). Also looking at '92: the White House Science Office, the Office of Technology Assessment, and the Congressional Research Service.

NSF is planning to beef up its representation in Europe, which now consists of Patrick Johnson, based at the US Embassy in Paris. Tom Owen, a veteran Japanese affairs specialist with NSF in Washington, is slated to join the Paris office as soon as the State Department says okay on office space. NSF's only other representative abroad is Tokyo-based Chuck Wallace.

The price of the Superconducting Super Collider is up by $2 billion (to a total of nearly $8 billion). Congressional doubts rise with the cost, but on Capitol Hill they're saying the Texas base and Presidential commitment can manage that boost, though not much more.

A George Polk Award, one of the top honors in journalism, has been awarded to John Crewdson, of the Chicago Tribune, *for his 50,000-word report last November challenging Robert Gallo's highly honored claims in identification of the AIDS virus. NIH, spurred by Congressional inquiries about Crewdson's report, is organizing an investigation that's intended to provide the final word on Gallo's role, the subject of evil rumors for several years.*

. . . Says Japan Assumes US is "Super Generous"

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it would go into the public domain before the people who did it tried to interpret it. Such a scheme—which I'm not sure you could ever do—sounds very nice to the general public. But it would demand that if we were doing it this way, that other nations would put their data in, so that we wouldn't just be handing other nations the fruit of our effort without having the fun of interpreting it. You have to have something to trade if you want to see it a little early. I don't think I would be in favor of giving the Swiss first look at the sequences if they haven't paid in.

SGR. *You suggested $300,000 in support by Japan.*

Watson. That was trivial. But then they came back that their laws don't allow it. Matsubara is rather—you know, he has no money to give away. He's an excellent scientist, but I think he has run up against bureaucratic [resistance]. And I think like many people, they assume the United States is just super generous and will compensate for the deficiencies in their own governments. I don't think that's a politically acceptable thing.

SGR. *Several hundred Japanese are guest workers at NIH—paid for by the US.*

Watson. And I think that should change.

SGR. *That should change?*

Watson. I personally think they should pay their way and not that we pay to educate them.

SGR. *Perhaps more important, it's a window on the world's biggest biomedical research enterprise.*

Watson. Things have to be on a two-way street. We've acted as if we were the only wealthy country in the world. And that's no longer true. We're certainly not poor, but I think we should expect to be treated—. My letter to Matsubara indicated that I would expect the Japanese should show gratitude for the way we treated them after the world war.

SGR. *Your letter suggested that?*

Watson. Yes, personally. That I saw no evidence of that in Japanese behavior, and I still haven't today. My hope is that HUGO, which will come into existence with private money, can be converted into a body—whether with a treaty or in some form, and governments will come in and proportion the costs out, so that it can be done. That's my aim, and I am still optimistic this will occur with the Japanese. I think the French give indications that they're going to be strong supporters of the project. The UK has made a commitment. Then there will be the umbrella of the EEC [European Economic Community] and the individual European countries.

SGR. *Do you see a change of attitude on the part of the Japanese?*

Watson. I haven't been there. I saw Matsubara in Paris in January, and he expressed optimism that he'd be able to raise some money for HUGO. I think there are other issues which will all have to come together: the Super Collider, the Space Station.

SGR. *Are these really linked?*

Watson. No, but the relations between Japan and the United States are under discussion. Economic relations between the United States and Japan will increasingly dominate American thought. People aren't born friends. They have to have reasons to be friends. The Japanese keep saying we have to understand how they think. I think they also have to understand how we think. They're so concerned with how they think, they don't really know that we also have our deep emotions and our pride.

SGR. *Do you think they're abusing the relationship?*

Watson. They support their own science at a much lower level than we do. So, they're not preferentially treating their scientists well. The role they give to this type of science [genome research] in their country—I see no reason why we should tell them how to behave. In that sense I agree with James Fallows [American journalist who has written extensively on Japan] that I don't think you can expect the Japanese to alter their views on green grocers any more than they should expect us to alter our views on how NIH should distribute its money. The reverse argument [offered by Japan] is that we don't spend money on science, so you're embarrassing us by spending too much on it. I think the genome project is something we can do by ourselves. I think if we do it by ourselves, it will greatly strengthen our country. I think other countries will not wish to see the United States so totally dominate something so important and will join up.

SGR. *Do you agree with the frequently made charge that the Japanese have a parasitic relationship to science?*

Watson. I think that's certainly been true, because they survived very well without it, and I'm sure Mrs. Thatcher must look at them, and her reason why should she support her academics; she may just look at the Japanese and see that they've done very well. You can say, well, one person, one place in the world has to do it [conduct basic research]. We can just say, we'll support science, but we'll just put a science tax on every bit of goods that came in from Japan.

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. . . Genome Project to Finance Ethical Studies

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You can do it in various ways, in a unilateral way, rather than trying to get them to change their policy. Just say, this costs us a lot of money, it benefits everyone, and therefore, this is the way we'll make you pay for it. My main concern is to get the project done here in the United States and not take on tasks which are beyond my capabilities, which would be having anything to do with the way the Japanese, or any other country, behave.

SGR. *What is your authority over the genome project? You have an unusual, probably unique, relationship with NIH. You organized the project as an Associate Director of NIH and at the same time you head a private laboratory that receives $13-14 million a year in grants from NIH.*

Watson. Now it's become more organized. I'm no longer an Associate Director of NIH. I'm just Director of the [NIH] Center for Human Genome Research.

SGR. *Whatever the title, you're Director of an important component of NIH, and you're also Director of a laboratory that receives substantial support from NIH.*

Watson. I wish I didn't have two burdens.

SGR. *But you do. Now, when you make an assertion about the genome project—.*

Watson. Oh, I'm making that as head of the Center. I went to Eli Lilly [to present a talk about the genome project]. They handed me a check and I handed it back, and I said, look, I'm here as a government employe. If I go anyplace in my role as head of the genome thing, I go with all the rules of the government employe.

SGR. *But yours is a very unusual case of wearing several hats. Your laboratory receives a good deal of money from NIH.*

Watson. And that is tricky because we're not trying to exclude genome. I never see the grant applications. And now when NIH site visits the lab, I don't appear as Director of the lab.

SGR. *Do you stay out of the scene?*

Watson. Totally out of the scene. And then when grant applications come [to NIH] from Cold Spring Harbor, I never see them in my office. They exclude me from seeing anything which says Cold Spring Harbor.

SGR. *Does Cold Spring Harbor have funding from the Genome Center at NIH?*

Watson. [One of our researchers] may have some. [Another] is applying to DOE. There's a small application for supporting what's rapidly becoming a big genome meeting. If I thought that Cold Spring Harbor couldn't accept any money, I would resign from the genome program. I wouldn't do anything to hurt the laboratory.

SGR. *"Little science" was initially frightened that the genome project's claim on resources would alter the nature of NIH.*

Watson. At its maximum, it would be about 2 percent. I don't think that can alter the nature of NIH.

SGR. *When it's up and running, what will be the budget?*

Watson. We have said the project will require $200 million a year. The DOE [Department of Energy] component this year is $15 million and ours is $108 [million]. We couldn't have gone effectively any faster. Sen. [Tom] Harkin (D-Iowa) [Chairman of the NIH appropriations subcommittee] asked me couldn't we do the project in 10 years, and I say no. That we needed the first five years to work to get the sequencing costs down to a reasonable amount. And we didn't want to start massive sequencing until we've got the costs down. Fifty cents a base is realistic. It means an improvement of a factor of about five from the best we've done today. That won't demand some extraordinary technical breakthrough. DOE has emphasized finding an exciting new sequencing technology. I think that's a laudable objective, but I don't think we should count on it.

In the 1990 budget [for the fiscal year ending September 30, 1990], there are three centers and then there's proposed six more in the 1991 budget. We're in the process of setting up a special study section to handle these centers.

SGR. *Will these go through the regular NIH review process at the Division of Research Grants?*

Watson. No, in the case of the centers, we will set up our own study section, like the Cancer Institute does for its cancer centers. The other applications all go through the Division and the study-section process there.

SGR. *What will be the size of these centers?*

Watson. About 50 people, at $5 million per center. The project could be completed faster if the other major industrial countries came in and started sequencing. The final cost to the United States might be $500 million, if the others came in. There's the money we're going to spend for the first five years, which is really just preparation for getting the whole thing going. That's a billion dollars appropriation and two billion to finally complete it.

SGR. *You've often said publicly that you want the American economy to benefit from the genome project.*

Watson. One of the things we've been talking about is meeting with the heads of the major companies, just to discuss the dilemma of how the sequence data should be handled. Just so they can think about it themselves and anything we finally decide to do will not be done without consulting them. I wouldn't want to do anything which would be seen as against the interests of industry, so I want to work with them.

SGR. *You're setting aside 3 percent of the NIH genome budget for social, ethical, and legal studies. That's a lot for these fields, which are generally neglected.*

Watson. Yes, it is very substantial, but, I think, necessary, because of the misuses of genetics and eugenics programs when there was really no human genetics knowledge. It was pseudoscience, but it led to sterilizations and immigration controls. There's the whole question of confi-

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. . . Attention to Scientific Misconduct is Beneficial

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dentiality, which is so important. I'm hoping that this sort of ethics money can be used in the usual way for a lot of discussion and for the passage of laws that will make people feel assured [that the information will not be used to their disadvantage].

SGR. *NIH has been without a Director since Wyngaarden left last August. Has that affected your activities there?*

Watson. Up to now, no. He was the one who set into motion my appointment and the creation of the Center. When I say it hasn't affected us, it reflects how little power the NIH Director has. The Institute directors are pretty much masters in this, and outraged at the thought the NIH Director could switch 1 percent of an institute's budget to some really radical new need. The Director can't do anything—I think that's probably the chief reason people don't want the job. The salary is secondary, but it's the fact that you would take the job if you actually think you could do something, even though you lose money by the deal. Since I've taken it [my position at NIH], it's a financial loser, because as Director of the Center, I can't charge my plane fare down here. I get paid, but that won't actually compensate for the travel expenses.

SGR. *The issue of scientific misconduct has got a lot of attention in Washington.*

Watson. People should keep better note books. There have been serious misuses of position, with grants having many names and courtesy authorships; with people involved who clearly don't know what's in the paper. I think that it's going to be a lot less frequent as a result of the attention.

SGR. *Has it been beneficial, at least in that respect?*

Watson. Yes, very beneficial. The major professors of medicine want to be known as major scientists as well as major physicians. That's probably something no one can be. But if they don't put their names on papers, then they would lose respect. And so they get it both ways. I think the message is now that maybe they don't have to do it that way. I never put my name on my graduate students' papers. I have only about 30 publications in my life. Salvador Luria [Watson's PhD supervisor] never put his name on my papers. I'm following his example, but that's very, very rare.

SGR. *Some people claim 500 to 1000 publications.*

Watson. I'm sure in many of these cases, they don't know what's in the papers. In some cases, certainly, they do. The Feder-Stewart "audit" [*Nature*, January 15, 1987, examining the internal accuracy of a series of published papers] clearly indicated that co-authors never looked at the figures, they never read the papers. They weren't accountable for what was in the papers. A name could be on the paper because you sent someone some antibodies. People often say, I'll send you antibodies if you put my name on the paper.

SGR. *Have you personally encountered that?*

Watson. I've heard of these things all my life. I won't name names, but it's extremely common.

SGR. *What do you think about the renewal of the Gallo-Montagnier controversy [concerning priority for identification of the AIDS virus; SGR, December 1, 1989]?*

Watson. That it should be looked at by some outside, impartial body which could finally settle some facts that people have never quite understood.

SGR. *Do you feel, as some do, that there are some disturbing loose ends there?*

Watson. As an NIH official, I don't think I should say anything more for the record.

SGR. *Nothing more on the record?*

Watson. For the record, I am pleased that a committee is being appointed [by NIH].

SGR. *To get to the bottom of this for once and for all.*

Watson. Yes, it has to be, because I don't think it's in anyone's interest. I know it has seriously disturbed Bob [Gallo] for years.

SGR. *The case involving David Baltimore's defense of a co-author's research data has lingered on for several years [SGR, October 15, 1989]. Why can't NIH settle these matters in reasonable time?*

Watson. It's hard, partly because no one really wants to be involved in [investigating and judging] this sort of thing, and taking time off from work to do it. But what comes out is that when charges are made, it's in everyone's interest that they be done swiftly and not be delayed. [The Baltimore case] has gone on too long. Personally, I think that even though people's notebooks are private, if someone says, do they actually exist, it's best to show them, and fast.

SGR. *Do you think there was a failure to deliver the notebooks in a timely fashion in the Baltimore case?*

Watson. I don't really know. But having witnessed the pain that can result, I think—. If you have it, you have it. I keep hoping that finally NIH will issue a report and David [Baltimore] will be cleared and the goddamned matter will end. It's partly not the fault of anyone. It's that you've got lawyers into it. Everyone is trying to protect people with due process, so no one will be convicted unfairly. But it also means you can never be cleared quickly. When someone cries "fraud," you've got to respond, or people are going to believe it. You can't attack the bearer of bad news. That never works. The scientific community shouldn't be treated differently from other groups. People shouldn't regard scientists as any more honest than a bank president, a respected man in the community.

SGR. *Is it as bad as that?*

Watson. The hardest problem in science is not deliberate dishonesty, faking data. Corruption comes in priority over ideas, of giving credits. That's where people can be disillusioned, in stealing something which should be shared or which they don't deserve at all. There are seldom penalties for that. That's more often taken as part of normal life. That becomes much worse now with money being scarce for

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US, EEC Leaders Ponder Impact of '92 on Science

Expressions of anxiety, resentment, and affection filled the National Academy of Sciences (NAS) March 5-6 as leading mandarins of American and European science and technology met to discuss Europe 1992 and the effects it might have on scientific relations between old friends.

The consensus was that the sci-tech involvements of the Old and New Worlds are strong and congenial and it would be advantageous all around for them to continue in that fashion. But, on the American side, there were also overt expressions of concern about the new Europe looking and building inward, to the detriment of trans-Atlantic collaboration. The Europeans scoffed at that fear, and proceeded to express dismay about America's reliability as a partner in big ventures, such as the financially wobbly American-led space station. Pleading the US guilty to that indictment, D. Allan Bromley, the White House Science Adviser, announced that correction of the "unreliable partner" problem was another item on his increasingly lengthy agenda.

The opening talk was delivered by Filippo Pandolfi, who, in the European Commission, bears the modest title of Commissioner for Science, Research & Development, Telecommunications, Information Industries and Innovation, Joint Research Center. Pandolfi commenced with obligatory sweet talk about ancient and harmonious relations, but then got down to gripes that the meeting was intended to ventilate. American firms, he said, are not assigning enough R&D to their European subsidiaries.

To correct this problem, which does not rank high on the American science-policy agenda, he recommended more joint research activities, particularly, he said, on publicly funded projects. Among the topics he cited was "prenormative," or early-stage, research on biotechnology regulations, a field in which he acknowledged the US leads Europe. Energy and environment, with an emphasis on global change and acid rain, were also cited as candidates for cooperative research.

Pandolfi left his audience with the news that at a meeting that morning with US Science Adviser Bromley he had proposed creation of a US-EC task force to examine sci-tech topics of mutual interest, including global change, the genome project, fusion, high-energy physics, the space station, deep-sea research, and on down an expectable list.

The sweep of issues was impressive. But when it was disclosed during questioning that the EC commands only three percent of the Community's R&D spending, with the rest clutched by national agencies and likely to remain there, some of the Americans present recalibrated their impression of Pandolfi's significance.

Next up was Erich Bloch, Director of the National Science Foundation, who said that the impending elimination of internal economic barriers among the 12 European nations raises questions and concerns about old ties with the US. Bloch noted that in 1984, American civilian R&D spending exceeded Europe's by 40 percent; last year, the margin was down to 10 percent. Europe, he continued, is rapidly catching up to the US in trained manpower and variety and scope of R&D projects, big and little.

These developments, Bloch said, have been accompanied by what he described as a disturbing decline in enrollments of European students in American universities. Bloch also expressed concern about the possibility of big international projects squeezing funds for "small science." The potential risk, he cautioned, is that the dynamic growth of science in Europe could "force major dislocations in established relationships." But then taking the hopeful line adopted by all the speakers, Bloch noted that powerful "positive forces" are also in the picture.

On a panel discussion on "Access to Precompetitive Research Programs of the European Communities," Jean-Jacques Ruby, Group Director of Science & Technology, IBM Europe, complained that IBM has been systematically excluded from many important collaborative programs in Europe. Its efforts to provide members for peer-review bodies have been ignored, Ruby said, leading him to the conclusion that the EC accords "slightly less equal rights" for foreign-held firms to participate in EC research.

Bromley's talk drew the greatest interest, not only because many in the audience of 300 were getting their first look at him, but also because he alone of the participants could be regarded as speaking for the Bush Administration.

He uttered the customary words about the importance of maintaining open communications in basic research and the need for international collaboration on mega-projects, including the space station, human genome research, and the Superconducting Super Collider. Then he directly addressed the issue of the US as an "unreliable partner," with particular reference to the space station, which the US, under budget pressures, has unilaterally scaled down to the outrage of foreign partners that it implored to join the project. Describing the space station as the biggest international project of all time—$16 billion from the US, $7 billion from Europe, Japan, and Canada—Bromley said the wavering US commitment is attributable to a system of annual appropriations, in contrast to Europe's process of multi-year funding.

Acknowledging the validity of Europe's complaints, Bromley said he was exploring the possibility of elevating America's big international high-tech commitments to treaty status, which would make financial support obligatory rather than subject to annual political currents. He didn't say how

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Watson *(Continued from Page 4)*

science. One of the problems now is that because there are so many scientists, and it's so big, there are no perceived moral leaders in our profession, in the sense that Niels Bohr was perceived in physics. Someone who sets a standard for behavior. People need role models.

Declining Balance at the Main US R&D Data Bank

The unfathomable Washington scene: Congress saved the National Technical Information Service (NTIS) from being cannibalized by the Reagan privatization campaign. But NTIS, a self-supporting Commerce Department agency which is supposed to be the central data bank for reports of federally supported research, is nonetheless suffering a lingering death. NTIS's plight was described March 8 by Fred B. Wood, Senior Associate, Congressional Office of Technology Assessment, to a hearing of the House Subcommittee on Science, Research, and Technology. Following are excerpts.

. . . over the last year and a half, the health of NTIS has continued to deteriorate to the point where, unless current trends can be reversed, the future of NTIS is in serious doubt. . . . So-called electronic sales are the only major NTIS product lines that are growing and profitable. Electronic sales account for about one-quarter of NTIS revenues, $6.35 million out of $24.4 million total revenues for fiscal 1989.

The major challenge facing NTIS is the declining demand for paper and microform copies of documents in the NTIS archive. Demand has always been limited, but is now reaching levels that may be unsustainable. For example, sales of paper copies have declined from 752,000 copies in fiscal 1980 to 373,000 in fiscal 1989. Over the same period, sales of microfiche declined from 155,000 copies to only 60,000 copies. . . . About 40 percent of the documents never sell a single copy; only 15 percent sell more than 5 copies. An NTIS "best seller" is a document that sells more than 20 copies. . .

The second major challenge facing NTIS is the declining number of documents received from federal agencies. NTIS must depend on the voluntary cooperation of the agencies. The number of titles received by NTIS has dropped from 79,471 in fiscal 1983 to 69,760 in fiscal 1986 to 49,058 in fiscal 1989. . . .

At the present time, many federal agencies appear to be ignoring NTIS. For example, in fiscal 1989, the National Science Foundation, with over $2 billion in research, submitted only 201 documents. . . The Departments of Health and Human Services, Interior, Agriculture, Education, and Transportation, all conduct or sponsor major R&D activities; these agencies submitted roughly 650 to 900 documents each to NTIS in fiscal 1989.

[SGR Editor's note: Asked by Rep. George Brown (D-Calif.) whether legislation is needed to assure that federal agencies submit their papers to NTIS, Lee W. Mercer, Deputy Under Secretary of Commerce for Technology, replied: "The right laws are in place, but we still have an attitudinal problem."]

Job Changes & Appointments

On one of the more glacial appointive fronts in Washington, the White House has finally nominated two replacements for vacancies on the National Science Board dating back to last May. ***Peter H. Raven***, Director of the Missouri Botanical Garden, replaces ***William A. Nierenberg***, and ***Benjamin S. Shen***, Professor of Astronomy and Astrophysics, University of Pennsylvania, replaces ***Norman C. Rasmussen***. On May 10, the regular four-year terms will expire for eight appointees on the 24-member board, which presides over NSF.

Guy Stever has been appointed Chairman of a new Fusion Policy Advisory Committee in the Department of Energy. Stever was White House Science Adviser in the Ford Administration and has since been a regular on the science-advisory circuit. The Committee, scheduled to report in September, was created by the Secretary of DOE to sort out the multi-billion-dollar competition between DOE's magnetic and inertial confinement programs. ***James Kane***, of the University of California, will be Executive Director of the Committee.

William W. Fox, a marine biologist at the University of Miami, has been appointed head of the National Marine Fisheries Service; he will also hold the title of Assistant Administrator of the National Oceanic and Atmospheric Administration, parent agency of the Fisheries Service.

Albert H. Teich has been named head of the newly established Directorate for Science and Policy Programs at the American Association for the Advancement of Science. The directorate embraces a number of AAAS activities, including the Office of Public Sector Programs, which Teich headed since 1984.

Europe 1992 *(Continued from Page 5)*

far along the quest is, nor did he address the many difficulties inherent in the treaty process. Noting concerns about a cohesive Europe turning inward, Bromley frankly stated that American universities would face "a devastating shortage" without foreign students.

In a question period, Bromley's assertion about the importance of US-EC collaboration on mega-projects was brought up by Josef Rembser, Director General for Research in the West German Ministry for Research and Technology. Rembser observed that it has heretofore been the American practice to bring a project to an advanced stage of planning before inviting foreign participation. Will this continue?

Bromley thus found occasion for issuing another *mea culpa* in behalf of American science policy. Agreeing with Rembser's characterization of American practice, he said that the US must change its ways. As for Pandolfi's proposed task force, Bromley said he would study it.—DSG

More In Print: Manned Space, Tritium, Lobbying

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budget, agency-by-agency, and sifts out the items of interest to COSSA's constituency.

Order from: COSSA, 1522 K St. NW, Suite 836, Washington, DC 20005; tel. 202/842-3525.

Human Exploration of Space: A Review of NASA's 90-Day Study and Alternatives (63 pp., no charge), by the National Academy of Sciences (NAS) Committee on the Human Exploration of Space, a quick look at possible strategies for fulfilling George Bush's "commitment" for a manned visit to Mars via the moon. The extravaganza, variously priced at up to $400 billion, is Bush's bid for sunbelt aerospace support, while it gives VP Dan Quayle, Chairman of the National Space Council, relief from the funeral and inauguration circuit. The NAS committee, chaired by Guy Stever, a workhorse of the science-advisory establishment, was not asked whether moon-and-Mars is desirable but whether NASA is approaching it realistically. Answer: Technical and cost uncertainties are so numerous that nothing should be attempted quickly.

Order from: National Academy of Sciences, Committee on Human Exploration of Space, Room HA 292, 2101 Constitution Ave. NW, Washington, DC 20418; tel. 202/334-2855.

Nuclear Science: The Feasibility of Using a Particle Accelerator to Produce Tritium (GAO/RCED-90-73BR; 27 pp., no charge), by the General Accounting Office, Congress's investigative service, inspired by the shutdown for safety reasons of the Savannah River Site nuclear reactors for production of tritium, a gaseous isotope that enhances nuclear explosive power. The Brookhaven and Los Alamos National Labs, alert to new opportunities in an era of decline, proposed using accelerators to produce the stuff. GAO concluded that accelerator production is technically feasible and safer than reactor production, but an appropriate accelerator neither exists nor has been designed. Implicit in the production question is the scope of the nuclear arsenal in the warming state of Soviet-American relations.

Order from: USGAO, PO Box 6015, Gaithersburg, Md. 20877; tel. 202/275-6241.

The Lobbying Handbook: A Comprehensive Lobbying Guide (1118 pp., $129.50), for innocents wondering how to mine money and favors on Capitol Hill, this is a good starting place, replete with everything from Machiavellian advice to floor plans of the Congressional office buildings. Included are interviews with 80 members of Congress, staffers, lobbyists, plus detailed explanations of legislative procedures. The author-editor is John L. Zorack, a veteran Washington lobbyist.

Order from: The Professional Lobbying and Consulting Center, 1111 14th St. NW, Suite 1001, Washington, DC 20005; tel. 202/898-0084.

Venture News (no charge), quarterly newsletter of the New Jersey Commission on Science and Technology, one of the most vigorous and best-funded of the many state organizations promoting sci-tech for economic development; describes programs, gives names of contacts, etc.

Order from: New Jersey Commission on Science and Technology, 122 W. State Street, CN 382, Trenton, NJ 08625-0832; tel. 609/984-5615.

Science in Japan: Japanese Laboratories Open to US Researchers (144 pp., $15), papers from a joint symposium, January 1989, of the American Association for the Advancement of Science and the Japan Society for Science Policy and Research Management. Included are personal accounts of Americans' experiences in Japanese labs, along with advice on finding slots there.

Order from: Technology Transfer Society, 611 N. Capitol Ave., Indianapolis, Ind. 46204; tel. 317/262-5022.

Study Set of US Civilian R&D Role

The National Academy of Sciences is organizing a study of the role of the federal government in promoting civilian technology, a politically volatile issue in Washington. Mandated by the 1988 Trade Act, the study will be supported by the Departments of Commerce and Energy, plus NASA, but, ironically, not by the Pentagon, which is the government's big but silent supporter of civilain technology. John S. Wilson is Director of the study, due for completion in about a year. The study committee is being selected.

Indirect Costs Addenda for Universities

Accidentally omitted on SGR's March 1 list of indirect-cost rates for "top dollar" universities:

Brown University, 68 percent; Princeton University, 67 percent.

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In Print: Interdisciplinary Research, Manufacturing

The publications listed are obtainable as indicated—not from SGR.

Interdisciplinary Research: Promoting Collaboration Between the Life Sciences and Medicine and the Physical Sciences and Engineering (39 pp., no charge), from a committee of the National Academy of Sciences co-chaired by S. James Adelstein, Harvard Professor of Radiology, and George B. Benedek, MIT Professor of Physics and Biological Physics, says disciplinary boundaries and traditions are impediments to potentially fruitful scientific inquiry. The report disapprovingly notes that NIH focuses almost exclusively on the life sciences, while NSF emphasizes the physical sciences. Among recommendations for shaking things up: joint NIH-NSF funding of interdisciplinary projects and more private foundation support for risky projects and for assisting researchers to shift fields. The report also urges the Department of Energy "to remain sensitive to its unique role as a facilitator of collaborative research."

Order from: National Academy of Sciences, Board on Physics and Astronomy, 2101 Constitution Ave. NW, Washington, DC 20418; tel. 202/334-3520.

Making Things Better: Competing in Manufacturing (GPO Stock No. 052-003-01178-6; 241 pp., $11), adding to the flood of reports on the failings of American industry, this is the second in a planned series of three by the Congressional Office of Technology Assessment. It says that Japan and the amalgamating European nations are successfully orchestrating national efforts to promote industrial winners, while the US government "is dozing at the switch." The old villains of high capital costs and quick-profit seeking are acknowledged, but OTA also notes that the US lags far behind Japan in direct government efforts to boost industry, including programs to spread new technologies to small firms.

The first in the OTA industrial series was ***Paying the Bill: Manufacturing and America's Trade Deficit*** (GPO Stock No. 052-003-01124-7; 83 pp., $4). Due in late 1990: a report on "the industry and trade policies" of major Asian manufacturing nations and Europe "and their effect on US competitiveness."

Also from OTA: ***Computer Software & Intellectual Property*** (GPO Stock No. 052-003-01181-6; 29 pp., $2), a background paper for the House Judiciary Subcommittee on Courts, Intellectual Property, and the Administration of Justice, says US domination of world software markets is under pressure from Europe and Japan. Copyright, patent, and trade-secret security are vital for protecting the industry, OTA says, but it warns that ham-handed application could impair American firms. What to do? OTA provides a long list of questions for further study.

Order from: USGPO, Superintendent of Documents, Washington, DC 20402; tel. 202/783-3238.

Maintaining the Integrity of Scientific Research (GPO Stock No. 552-070-07693-0; 1455 pp., $32), transcript of a hearing last June 28 by the Subcommittee on Investigations and Oversight of the House Science, Space, and Technology Committee, followed by an immense appendix that omits virtually nothing published in the past five years on scientific delinquency. For $1, a 15-page summary of the hearing, ***Hearing Summary*** (GPO Stock No. 552-070-07562-3).

Order from: Congressional Sales Office, USGPO, Superintendent of Documents, Washington, DC 20402; tel. 202/275-3030.

COSSA Washington Update, biweekly newsletter of the Consortium of Social Science Associations, the Washington outpost for dozens of scholarly and professional organizations in the social and behavioral sciences. (Subscriptions: $50 per year for individuals; $90 for institutions; add $90 for overseas airmail). Provides thorough coverage of matters involving these disciplines in federal research agencies, the White House, and Congress, along with reports of program changes, analyses of trends, dangers, etc. The February 28 issue (30 pp., $5 per copy) examines the President's 1991

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